REMARKS

Reconsideration of this application is requested in view of the amendments to the specification and claims and the remarks presented herein.

The claims in the application are claims 1 to 41, no other claims having been presented. The claims have been limited to the elected subject matter and Applicants reserve the right to file a divisional application directed to the non-elected subject matter.

The specification has been amended to insert reference to the provisional application and therefore, Applicants are entitled to the benefit of the non-provisional application. The objection to claim 31 is not understood since, as presented in the amendment of October 11, 2001, the objected to terminology does not appear. With respect to claim 15, propylene is properly spelled. If the Examiner has a further objection to claim 15, he is requested to more clearly define what the objection is.

Claims 1 to 30 have been rejected under 35 USC 112, second paragraph, as being indefinite for the reasons set forth in the office action.

Applicants respectfully traverse these grounds of rejection since the amended claims are believed to comply with 35 USC 112.

Claim 1 has been amended to insert a bond in the group of Formula V. Claims 4 to 6 have been amended to put them into the alternative form. Claim 6 has further been amended to indicate "isopropyl" to clarify the same. Claim 13 has been amended to delete the parenthesis therein which was inadvertently set forth in the claim. Claim 14 defines R_5 as being perfluoroalkyl and has an "and" in the same and does not have the terminology that the Examiner states. Claim 16 has been amended to clarify that "1, 2" refers to the carbon atoms in the 1 and 2 position of the glycerol wherein the initial hydroxy group is absent. Claim 22 has been amended to indicate that the nucleic acid is introduced into the cell host and claim 24 has been amended to indicate that the nucleic acid is introduced into the cells of the host organism. Therefore, the amended claims are believed to be proper and in compliance with 35 USC 112, second paragraph. Therefore, withdrawal of this ground of rejection is requested.

Claims 1 to 4 and 7 were rejected under 35 USC 102 as being anticipated by the Xu et al patent. Claims 1, 2, 4 and 7 were rejected as being anticipated by the Xu et al patent. The other claims were not rejected on the prior art and presumably, claims 5, 6 and 8 to 31 are drawn to allowable subject matter.

With respect to the rejection of the claims as being anticipated by Xu et al, it is deemed that claim 1 no longer reads upon this because R^6 is defined as being an alkyl of 2 to 4 carbon

atoms whereas Xu et al only discloses wherein R^6 is methyl. The Xu et al patent does not disclose or suggest any vesicle comprising this compound nor its use and a method for introducing a nucleic acid into a cell host nor a complex formed between the nucleic acid and this compound as defined. The phosphonic acids disclosed by Xu et al are deemed to be used exclusively for replacing nucleotides or amino acids or to exert their biological activity as regulators, mediators or enzyme inhibitors or for a wide application in general organic synthesis as indicated in lines 20 to 35 of column 1 of the patent and the left column of page 7697 of the Xu et al patent. Therefore, Xu et al does not disclose or suggest preparing vesicle with lipophilic compounds nor their use for complexing nucleic acids. Therefore, the claims are not anticipated or rendered obvious by the prior art and withdrawal of these grounds of rejection is requested.

In view of the amendments to the claims and the above remarks, it is believed that the claims clearly point out Applicants' patentable contribution and favorable reconsideration of the application is requested.

Respectfully submitted,
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CAM:ds
Enclosures

Page 2 of specification with changes made thereto

--PRIOR APPLICATION

This application is a non-provisional application of U.S. provisional application Serial No. 60/175,342 filed January 10, 2002.- -

FIELD OF THE INVENTION

The invention lies in the field of compounds having affinity with nucleic acids and which may be used as non-viral vectors for introducing nucleic acids of interest within a desired host cell or a desired host organism.

BACKGROUND OF THE INVENTION

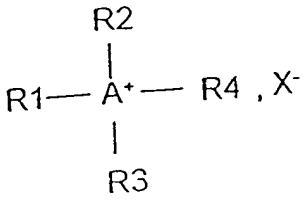
There has been a great deal of interest in recent years in developing non-viral vectors for carrying DNA through cell membranes into the nuclei with a view to gene therapy. From the recent review of A.D. Miller on "cationic liposomes for gene therapy" (Angewandte Chem. Int. Ed. Engl., 1998, 37, 1768-1785), which presents a survey of described cationic lipids up to nowadays, it is striking to note that among all the cationic lipids described in prior art, their positive charge is always borne by a nitrogen atom.

Among the non-viral lipophilic compounds already known in the art are halides of –1,2 dioleoyl-3 trimethylammonium deoxyglycerol, commonly named DOTAP, of –1,2 dioleyl-3 trimethylammonium, commonly named DOTMA, of dimethylammonium ethyloxycarbonylcholesterol, commonly named DC-chol, and many phosphonolipids such as those described by G. Le Bolc'h et al.. (Tetrahedron Lett., 1995, 36, 6681) or by V. Floch et al. (Eur. J. Med. Chem., 1998, 33, 12).

Nevertheless the poor transfection efficiency of the lipophilic non-viral vectors of prior art as well as their cell cytotoxicity properties has materialized a public need for non-viral vectors endowed with the same advantageous properties of the known compounds but which are endowed with increased transfection efficiency as well as with a lesser cytotoxicity.

MARKED UP VERSION OF CLAIMS SHOWING CHANGES MADE

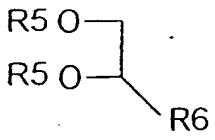
Claim 1 (twice amended) A compound of the formula



I

wherein A is phosphorus [or arsenic]; X^- is an anion; and wherein R1 [is selected from the group consisting of:

a)

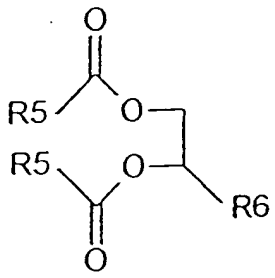


II

wherein R5 is a lipid moiety and R6 is a alkyl of 1 to 4 carbon atoms, and

R2, R3 and R4 of formula I are all methyl

b)

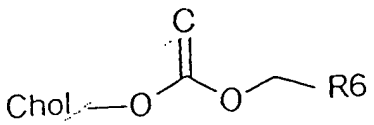


III

wherein R5 is a lipid moiety and R6 is a alkyl of 1 to 4 carbon atoms, and

R2, R3 and R4 of formula I are all methyl;

c)

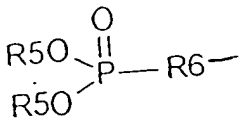


IV

wherein Chol is a cholesteryl and R6 is alkyl from 1 to 4 carbon atoms, and

R2 and R3 are both methyl and

d)]



V

wherein R5 is a lipid moiety and R6 is alkyl of [1] 2 to 4 carbon atoms,

R2 and R4 are alkyl of 1 to 4 carbon atoms; and R3 is selected from the group consisting of:

- alkyl of 1 to 4 carbon atoms,

CH_2-CH_2P^+(R6R7R8), R6, R7 and R8 are alkyl of 1 to 4 carbon atoms and

- CH_2-CO_2R9, and R9 is alkyl of 1 to 4 carbon atoms.

Claim 4 (twice amended) The compound of claim 1 wherein R5 is selected from the group consisting of:

(i) alkyl or alkenyl of 10 to 22 carbon atoms comprising 0, 1 or 2 olefinic double bonds,

(ii) a cholesteryl derivative [and] or

(iii) a perfluoro alkyl of 10 to 22 carbon atoms.

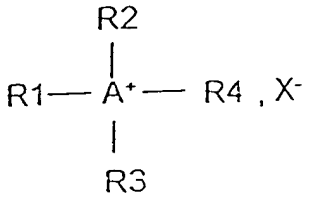
Claim 5 (twice amended) The compound of claim 1, wherein the R5 is selected from the group consisting of $C_{14:0}$, $C_{18:1}$, $C_{18:2}$; $C_{15:0}$, $C_{17:0}$ [and] or $C_{17:2}$, wherein the first number designates the number of carbon atoms and the second number designates the number of double bonds.

Claim 6 (twice amended) The compound of claim 1, wherein R1 is of formula V and R2 and R4 are independently a member selected from the group consisting of CH_3, C_2H_5, nC_3H_7 [and iso-C_3H_7] or isopropyl, with n being an integer from 1, 2 or 3.

Claim 13 (twice amended) The compound of claim 1 wherein R1 has the formula II, III or V, R5 consists of cholesteryl [-[C(O)N-CH_2-CH_2-O)]] -[C(O)N-CH_2-CH_2-O] and R6 is ethyl.

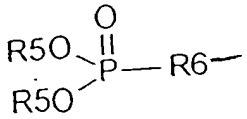
Claim 16 (twice amended) A compound according to claim 1 wherein R1 has the formula II, III or V, R5 consists of ($C_{18}H_{35}$) and R6 is 1,2-[deoxyglycerol] dioxyglycerol.

Claim 18 (twice amended) A vesicle comprising a compound [of claim 1] of the formula



I

wherein A is phosphorus; X^- is an anion; and wherein R1 is



V

wherein R5 is a lipid moiety and R6 is alkyl of 2 to 4 carbon atoms,

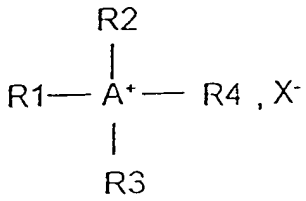
R2 and R4 are alkyl of 1 to 4 carbon atoms; and R3 is selected from the group consisting of:

CH_2-CH_2P^+(R6R7R8), R6, R7 and R8 are alkyl of 1 to 4 carbon atoms and

- CH_2-CO_2R9, and R9 is alkyl of 1 to 4 carbon atoms.

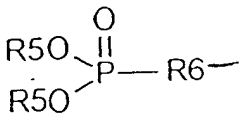
Claim 22 (twice amended) A method for introducing in vitro a nucleic acid in a cell host comprising the steps of:

a) incubating said nucleic acid with a compound of [claim 1] the formula



I

wherein A is phosphorus; X^- is an anion; and wherein R1 is



V

wherein R5 is a lipid moiety and R6 is alkyl of 2 to 4 carbon atoms,

R2 and R4 are alkyl of 1 to 4 carbon atoms; and R3 is selected from the group consisting of:

CH_2-CH_2P^+(R6R7R8), R6, R7 and R8 are alkyl of 1 to 4 carbon atoms and

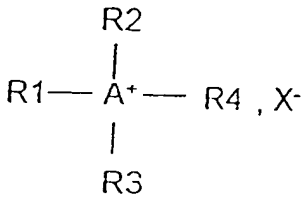
- CH_2-CO_2R9, and R9 is alkyl of 1 to 4 carbon atoms to obtain complexes formed between said nucleic acid and said compound, and

b) incubating the cell host with the complexes obtained at step a) whereby the nucleic acid is introduced into the cell host.

Claim 24 (twice amended) A method for introducing in vivo a nucleic acid into cells of a host organism comprising the steps of:

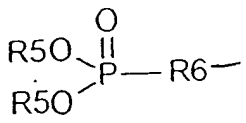
a) incubating said nucleic acid with a compound of [claim 1]

the formula



I

wherein A is phosphorus; X^- is an anion; and wherein R1 is



V

wherein R5 is a lipid moiety and R6 is alkyl of 2 to 4 carbon atoms,

R2 and R4 are alkyl of 1 to 4 carbon atoms; and R3 is selected from the group consisting of:

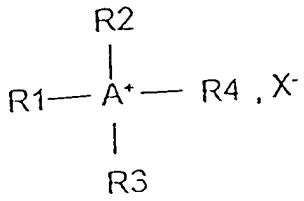
CH_2-CH_2P^+(R6R7R8), R6, R7 and R8 are alkyl of 1 to 4 carbon atoms and

- CH_2-CO_2R9, and R9 is alkyl of 1 to 4 carbon atoms

to obtain complexes formed between said nucleic acid and said compound; and

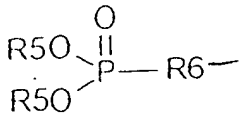
b) administering the complexes obtained at step a) to said host organism whereby said nucleic acid is introduced into the cell of the host organism.

Claim 26 (twice amended) A complex formed between a nucleic acid and a compound of [claim 1] the formula



I

wherein A is phosphorus; X^- is an anion; and wherein R1 is



V

wherein R5 is a lipid moiety and R6 is alkyl of 2 to 4 carbon atoms,

R2 and R4 are alkyl of 1 to 4 carbon atoms; and R3 is selected from the group consisting of:

CH_2-CH_2P^+(R6R7R8), R6, R7 and R8 are alkyl of 1 to 4 carbon atoms and

- CH_2-CO_2R9, and R9 is alkyl of 1 to 4 carbon atoms

to obtain complexes formed between said nucleic acid and said compound; and

b) administering the complexes obtained at step a) to said host organism whereby said nucleic acid is introduced into the cell of the host organism.